

## 6269.0 - Information Paper: Labour Force Survey Sample Design, May 2013

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## Summary

### Contents

#### CONTENTS



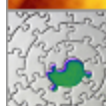
##### **Introduction**

Includes: Overview, and Labour Force Survey data.



##### **Survey Methodology**

Includes: Collection methodology, Scope and coverage, and Non-response.



##### **Sample Design**

Includes: Sample selection, Allocation of sample, and Sample rotation.



##### **Method of Estimation**

Includes: Benchmarks, Weighting, and Reliability of estimates.



##### **2011 Sample Design**

Includes: Aims of the 2011 design, Design changes, Sample allocation, Sample size, Sampling fractions, and Phase-in period.



##### **Previous Sample Designs**

Includes: the main changes in sample design and estimation procedures introduced at each sample design from 1971.



##### **Impact on Standard Errors**

Includes: Standard errors, Relative standard errors and comparisons between the 2006 and 2011 standard errors design.



##### **Regional Estimates**

Includes: Labour Force Survey statistical regions, Changes to Labour Force Survey regions, Quality of estimates, and Data comparability.



##### **Other Estimates**

Includes: Labour Force Survey, and Associated surveys.

## Introduction



### INTRODUCTION

#### OVERVIEW

The Australian Bureau of Statistics (ABS) has been conducting the Labour Force Survey (LFS) since 1960. Originally the survey was conducted quarterly, before becoming monthly in February 1978. The LFS provides information on the labour market activity of the usually resident civilian population of Australia aged 15 years and over.

Every five years, following the availability of data from the Census of Population and Housing, the ABS reviews the LFS sample design. While the design has remained broadly the same since the introduction of the LFS, the review ensures that the survey sample continues to accurately represent the Australian population, and remains efficient and cost-effective.

The review of the LFS sample design based on 2011 Census data has been completed. For the key LFS estimates, the 2011 sample design generally maintains standard errors at the levels targeted under the 2006 sample design. The new sample design will be implemented in the LFS over the four month period May 2013 to August 2013.

This paper provides detailed information on the LFS sample design based on the 2011 Census of Population and Housing. It also outlines changes made in this sample design. These changes include:

- the use of a new Australian Statistical Geography Standard (ASGS) for sample selection and output;
- the roll-out of the new sample over a four month period; and
- the decoupling (separation) of the samples for the Monthly Population Survey (including the LFS) and for Special Social Surveys.

This information paper outlines:

- the methodology of the LFS;
- the new sample design;
- the changes arising from this new sample design; and
- the impact of the new sample design on the key estimates at national, state and regional levels.

The LFS sample is also used for a number of supplementary surveys and the Multipurpose Household Survey (MPHS). Further information about these surveys is available in the Other Estimates section of this information paper.

## LABOUR FORCE SURVEY DATA

The LFS collects a wide range of information about the population. For employed people, this includes information such as whether they work full-time or part-time, and their industry, occupation, hours worked and status in employment. For people who are currently unemployed, the survey collects information about whether they are looking for a full-time or part-time job, how long they have been unemployed, and the characteristics of their last job (industry, occupation, and reason for leaving). The survey also collects personal characteristics such as sex, age, marital status, relationship in household, participation in school and tertiary education, birthplace and year of arrival in Australia.

Estimates of the number of employed and unemployed people, the unemployment rate and the labour force participation rate are of considerable interest each month, as are the aggregate hours worked and underemployment. The rate of change in the level of employment is a key economic indicator. The unemployment rate (the proportion of the

labour force who are unemployed) is the main measure of unutilised labour, while the participation rate (the proportion of the population in the labour force) reflects changes in total labour availability.

The conceptual framework used in Australia's Labour Force Survey aligns closely with the standards and guidelines set out in Resolutions of the International Conference of Labour Statisticians. Descriptions of the underlying concepts and structure of Australia's labour force statistics, and the sources and methods used in compiling the estimates, are presented in Labour Statistics: Concepts, Sources and Methods (cat. no. 6102.0.55.001), which is available on the ABS website <<https://www.abs.gov.au>>.

Survey estimates and time series data are published monthly in Labour Force, Australia (cat. no. 6202.0). More detailed data are available one week later in Labour Force, Australia, Detailed - Electronic Delivery (cat. no. 6291.0.55.001) and in the quarterly release Labour Force, Australia, Detailed, Quarterly (cat. no. 6291.0.55.003). These products are available on the ABS web site at <<https://www.abs.gov.au>>.

## IMPROVEMENTS TO THE LABOUR FORCE SURVEY

The ABS has been introducing a number of enhancements to the LFS. These changes include the new sample design, the introduction of online self-completion by respondents, regular population re-benchmarking of survey estimates to reflect the latest available information of the population, and improvements to the content of the LFS and labour supplementary surveys. The new sample may have some impact on the monthly change and the levels of the LFS. If there is any impact from online self-completion it will not be able to be separated from impacts of the new sample on key series during the time the new sample is implemented.

This Information Paper provides information on the new sample design. Information on the other improvements are available in the Article Archive and Notes sections of Labour Force, Australia (cat. no. 6202.0).

## Survey Methodology



### SURVEY METHODOLOGY

#### COLLECTION METHODOLOGY

LFS information is collected from the occupants of selected dwellings by either trained interviewers (face-to-face or via telephone) or using a specially designed self-completion online electronic form. Most data is collected during the two weeks beginning on the Sunday between the 5th and 11th of each month. Follow-up of non-respondents continues after these two weeks. The information obtained relates to the week before the data is collected (referred to as the reference week). Selected dwellings usually remain in the survey for eight months. An exception is during the new sample introduction in 2013, where some dwellings will remain in the survey for only four months.

Changes in data collection of the LFS have occurred over time reflecting technological and methodological advances. Prior to August 1996, all interviews were conducted face-to-face with respondents. Over the period August 1996 to February 1997, the ABS introduced

telephone interviewing (with the first interview generally still conducted face-to-face). From December 2012, the ABS has been progressively introducing the option for respondents to self-complete the LFS online. The online collection option is scheduled to be rolled out to all respondents by early 2014.

Respondents selected in the LFS are sent a letter and brochure informing them that they have been selected and that an interviewer will visit them to interview their household. The letter advises that they have the option of providing their contact details securely online or ringing the office so an interviewer will visit their house at a time suitable to them. They can also opt to complete the survey over the phone.

Respondents in a trial rotation group have been provided with a third option of self-completing their survey securely online in place of an interview. The trial of online self-completion of labour force data from households has been undertaken since December 2012. The expansion of the offer of online self-completion in the LFS coincides with the roll-out of the new sample.

Subject to the findings of analyses conducted on online collection, the ABS intends to progressively increase the offer to 100% of each incoming rotation group from September 2013. In the long term, it is proposed that online self-completion will become the primary form of collecting LFS data. Interviewer collection (both face-to-face and via telephone) will continue to be available for those respondents where it is inappropriate for operational, technological or personal reasons.

While the offer of online self-completion will gradually increase to 100% of the LFS, the ABS estimates that initially the completion of LFS online will only be around 10%-20% of those respondents who are offered the option. The take-up of online self-completion is expected to increase over time. For more information see the Transition to Online Collection of the Labour Force article in the April 2013 issue of Labour Force, Australia (cat. no. 6202.0).

Information may be collected about each household member within the scope of the survey from any responsible adult living in the household and may not be collected, in all circumstances from the person themselves. Where one person is unable (or it is inappropriate) to report for another member of the household, separate interviews are available. Where the person interviewed is unable to supply all of the details for another member of the household, that individual is interviewed personally.

Special collection arrangements may be used for a small number of non-private dwellings where it is not appropriate to approach individuals (for example in hotels, motels, hospitals, homes for the aged, university colleges, boarding houses, predominantly non-long stay caravan parks etc). This may involve collecting the data from a suitable contact.

Collection arrangements for remote Aboriginal and Torres Strait Islander communities utilise community based coordinators or specially trained interviewers.

## SCOPE AND COVERAGE

The scope of a survey is the population about which information is to be collected. The LFS scope is restricted to the usually resident civilian population of Australia aged 15 years and over.

The LFS does not include:

- members of the permanent defence forces;
- certain diplomatic personnel of overseas governments, customarily excluded from

- census and estimated population counts;
- overseas residents in Australia;
- members of non-Australian defence forces (and their dependants) stationed in Australia, and;
- Jervis Bay Territory, the Territory of Christmas Island and the Territory of Cocos (Keeling) Islands. They are out-of-scope for most ABS collections other than the Census of Population and Housing.

Coverage rules are applied to the LFS to ensure that each person is associated with only one dwelling, and hence has only one chance of selection in the LFS. Persons who are away from their usual residence for six weeks or less at the time of interview are enumerated at their usual residence. This information may be obtained from other usual residents present at the time of the survey. The chance of a person being enumerated at two separate dwellings in the one survey is considered to be negligible.

LFS estimates relate only to place of usual residence, and are calculated in such a way as to add to independently estimated counts (benchmarks) of the usually resident civilian population aged 15 years and over and compensate for any under-enumeration in the survey.

## NON-RESPONSE

Non-response arises when no information is collected from one or more occupants of a selected dwelling.

Interviewers make a number of attempts to contact households at different times of the day and on different days during the week. For households and persons unable to be contacted by telephone, face-to-face visits are attempted. If the household still cannot be contacted within the survey period after repeated attempts (and if the dwelling has been verified as not vacant), it is listed as a non-contact. Non-contact is the most common form of non-response.

The response rate commonly quoted for ABS household surveys refers to the number of fully responding dwellings expressed as a percentage of the total number of selected dwellings excluding sample loss. Examples of sample loss for the LFS include:

- households where all persons are out of scope and/or coverage;
- vacant dwellings;
- dwellings under construction;
- dwellings converted to non-dwellings;
- derelict dwellings, and;
- demolished dwellings.

Averaged over the five years from May 2008 to April 2013, the LFS response rate was 96.5%, which is high by international standards.

## Sample Design



### SAMPLE DESIGN

### SAMPLE SELECTION

The LFS sample consists of three components, which are separately identified and sampled:

- private dwellings (houses, flats, etc.);
- non-private dwellings (hotels, motels, hospitals, homes for the aged, university colleges, boarding houses, predominantly non-long stay caravan parks etc.); and
- dwellings in discrete Aboriginal and Torres Strait Islander communities.

The sample of private dwellings is obtained by a multi-stage approach. Using the SA4 structure of the Australian Statistical Geography Standard (ASGS), Australia is first divided into 88 geographical areas. In general, these areas are then sub-divided and grouped to form a strata. This strata is based on locality, population density, remoteness and projected population growth.

Within these strata, a multi-stage sample of geographic areas is selected, where the area sampling units are derived hierarchically (as described below). The areas at each stage are aggregations of mesh blocks. Meshblocks are the finest geographic unit in the ASGS and usually contain between 30 and 60 dwellings. The area sampling units are derived as follows:

- in the first stage of selection, the area sampling units are large enough to contain sufficient dwellings to provide enough sample for the LFS for five years. A sample of these areas is randomly selected by systematic sampling (with the probability of selection proportional to number of dwellings) to represent each stratum;
- for the second stage of selection, the sampling unit is a region contained within the selected first stage area units. One of these is randomly selected with a probability proportional to the number of dwellings. These area units are an aggregation of a number of mesh blocks to be large enough to provide at least five separate samples of dwellings for the third stage;
- in the third stage, a sample of dwellings in the selected block is taken using systematic equal probability sampling.

In less populated areas, there is an additional stage of selection in which selected first stage area units are grouped geographically, and selection occurs within these groups. This ensures the sample is not too geographically spread and is not prohibitively expensive to enumerate.

The sample of non-private dwellings is selected from a list of non-private dwellings in Australia. This is compiled from the 2011 Census of Population and Housing and updated using the Geocoded National Address File (G-NAF). A sample is taken from this list that represents each geographical area and different types of dwellings. For smaller non-private dwellings, each occupant is included in the survey; while for larger dwellings a sub-sample of occupants is taken.

The sample of dwellings in areas primarily consisting of discrete Aboriginal and Torres Strait Islander communities is obtained by:

- identifying those states and territories with sufficient population in discrete Aboriginal and Torres Strait Islander communities such that a separate sample can be selected from areas containing Aboriginal and Torres Strait Islander communities;
- grouping mesh blocks which contain Aboriginal and Torres Strait Islander communities that have community and outstation links and selecting a sample from these groups with a probability proportional to the number of dwellings in the group, and;
- taking a sample of dwellings in those selected communities using systematic equal probability sampling.

## ALLOCATION OF SAMPLE

The LFS is primarily designed to provide reliable estimates of the key labour force statistics for the whole of Australia. The secondary design is to produce key LFS statistics for each state and territory. The most accurate national estimates would be obtained if the total sample across Australia was allocated in proportion to the population of each state or territory. Conversely, to provide estimates of similar accuracy for each state or territory, approximately equal sample sizes would be needed for each.

The actual allocation of LFS sample across the states and territories is designed to balance the accuracy of national estimates with state and territory estimates. The proportion of the population in the sample (known as the sampling fraction) is larger in the states and territories with smaller populations, but not to the extent that would realise identical sample sizes for each state and territory. Within each state or territory, each dwelling has the same probability of selection.

## SAMPLE ROTATION

One of the primary requirements of the LFS is to provide a measure of change in the characteristics of the labour force over time, for both month-to-month variation and longer trends over time. The best estimates of change from one month to the next would be obtained if the survey was collected from the same sample of dwellings each month while providing for population growth. However, it is neither reasonable nor representative to continually retain the same respondents in the survey. Instead a proportion of the sample is replaced each month in order to measure changes in the labour force while also ensuring the survey is representative. This procedure is known as sample rotation.

Since the monthly LFS began in 1978, one-eighth of the sample has generally been replaced each month. The sample can be thought of as consisting of eight sub-samples (or rotation groups), and each month one rotation group which is a new sample of dwellings replaces a sample of dwellings which had been in the LFS for the previous eight months. The dwellings in the replacement sample usually come from the same areas as the dwellings they replaced.

Sample rotation enables reliable measures of monthly change in labour force statistics to be compiled, as seven-eighths of the sample from one month are retained for the next month's survey. At the same time, the sample rotation procedure ensures that no dwelling is retained in the sample for more than eight months.

The component of the sample that is common from one month to the next makes it possible to match the characteristics of most of the people in those dwellings: this group is referred to as the 'matched sample'. The availability of this matched sample permits the production of estimates of 'gross flows' - the number of people who change labour force status between successive months.

## Method of estimation



### METHOD OF ESTIMATION

### BENCHMARKS

LFS estimates of the number of people employed, unemployed and not in the labour force are calculated in such a way these totals add to independently estimated counts (benchmarks) of the usually-resident civilian population aged 15 years and over. These benchmarks are based on Census of Population and Housing data and are adjusted for scope differences and under-enumeration, and updated for births, deaths, interstate migration and net overseas migration.

Two sets of benchmarks are used in the LFS. The first set of benchmarks classify the population by state or territory of usual residence, part of state of usual residence (capital city, rest of state), age group and sex. The second set classify by region of usual residence and sex (known as 'regional benchmarks'). The regions published in the labour force estimates until January 2014 are based on aggregations of Australian Standard Geographical Classification (ASGC) (cat. no. 1216.0) 2006 regions but will be replaced with Australian Statistical Geography Standard (ASGS) (cat. nos. 1270.0.55.001 to 1270.0.55.006) Statistical Area Level 4s (SA4s) from January 2014. This is discussed in more detail under the Regional Estimates section of this information paper.

## WEIGHTING

To derive labour force estimates for the entire population in the scope of the survey, expansion factors (weights) are applied to the sample responses. The weighting method ensures that LFS estimates conform to the benchmark distribution of the population by age, sex and geographic area. This reduces sampling variability and compensates for any under-enumeration or non-response in the survey. It does not overcome any bias arising from non-response.

The LFS estimation method is a form of composite estimation and exploits the overlapping design of the LFS sample. It does this by combining the previous six months' sample responses with the current month's responses to produce the current month's estimates.

Initially, composite estimates for 11 sets of key LFS estimates are derived using the sample responses for the current month and previous six months.

Weighting factors (or multipliers) are applied to the seven months' sample responses. They determine the extent to which the responses over the seven month 'window' contribute to the current month's LFS estimates. They are based on the correlation structure observed in historical LFS data. While taking account of the multipliers, the weights of the sample responses are adjusted to align with current month population benchmarks. As a result, the weight assigned to a sample response is dependent on the geographic area, age and sex of the respondent, the month in which the response was collected and the number of months the rotation group has been in the sample. The set of composite estimates are then produced from the seven-months weighted dataset.

Finally, the current month's sample responses are weighted to both the population benchmarks and to the set of composite estimates produced from the seven-months' weighted dataset. The current month's estimates are produced from this weighted dataset, where the estimates for each characteristic of interest are obtained by summing the weights of the persons in the sample with that characteristic.

Further information about the LFS estimation method can be found in the information paper *Forthcoming Changes to Labour Force Statistics, 2007* (cat. no. 6292.0) which is available on the ABS web site <<https://www.abs.gov.au>>.

## RELIABILITY OF ESTIMATES



The accuracy of a sampling estimate refers to how close that estimate is to the true population value. The variation between the two is referred to as 'the error of the sampling estimate'. The total error of the sampling estimate results from two types of error:

- sampling error, which occurs because data were obtained from a sample rather than the entire population; and
- non-sampling error, which arises from imperfections in reporting, recording or processing of the data that can occur in any survey or census.

One measure of sampling error is given by the standard error of the estimate, which indicates the extent to which that estimate might have varied by chance because only a sample of dwellings was surveyed. There are about two chances in three that the estimate that would have been obtained if all dwellings had been included will differ by less than one standard error from a sample estimate, and about 19 chances in 20 that the difference will be less than two standard errors.

Expressing the standard error of an estimate as a percentage of the estimate to which it relates offers another useful measure of sampling variability. This is known as the relative standard error (RSE).

Standard error estimates published in association with any LFS results are mathematically modelled after each sample redesign using estimates on a range of sub-populations (e.g. broken down by sex, age group, geography, etc.) from 12 months of survey responses.

For further information, refer to the Impact on Standard Errors section of this information paper.

Changes to the LFS, including the introduction of self-enumerated electronic online collection methods at the same time as the 2011 sample may result in some non-sampling errors, however the ABS is using its experience developed in introducing previous changes to the LFS and other statistical collections to minimise any potential impact. In addition, the ABS will monitor any impact of the move to online collection through a measurement strategy. Refer to the article, Upcoming Changes to the Labour Force Survey, in Labour Force, Australia, July 2012 (cat. no. 6202.0), for further information on the upcoming changes. For details of the LFS electronic collection refer to the Transition to Online Collection of the Labour Force Survey article in Labour Force, Australia, Apr 2013 (cat. no. 6202.0). Any identified non-sampling errors in a given month will be included in the Explanatory Notes section of the monthly Labour Force, Australia publications (cat. no. 6202.0).

More information is available in the Article Archive and Notes sections of Labour Force, Australia (cat. no. 6202.0).

## 2011 Sample Design



### 2011 SAMPLE DESIGN

#### AIMS OF THE 2011 DESIGN

To maintain the efficiency and effectiveness of the LFS over time, the 2011 sample design

has the following key aims:

- to achieve a level of accuracy for employment and unemployment estimates at the national level and for each state and territory comparable with the target accuracy established for the previous sample design;
- to align the multi-stage area sampling with the geography defined by the ASGS;
- to contain the costs of collection for the LFS sample, and;
- to provide sufficient sample for the LFS for the following five year period.

## DESIGN CHANGES

A number of improvements were considered in developing the new design and the following changes have been implemented:

- using the Statistical Area Level 4 (SA4) classification from the Australian Statistical Geography Standard (ASGS) to define the geographic sampling strata as a result of the ASGS replacing the Australian Standard Geographical Classification (ASGC);
- using the boundaries of mesh blocks in the ASGS to create the area sampling units within which groups of dwellings are selected, this replaces the Census Collection Districts used under ASGC;
- independent selection of two master samples of areas to provide separate available samples of dwellings for MPS and other ABS household social surveys. This is designed to better target Special Social Surveys; and
- a reduction in the initial sample size of around 4% compared with that initially implemented at the start of the 2006 design. This reduction is due to efficiencies of the 2011 sample design targeting the 2006 target Relative Standard Errors (RSEs). Further details are outlined in the in the Impact on Standard Errors chapter.

## SAMPLE ALLOCATION

There have been some minor changes to the relative sample allocation between the states and territories for the 2011 sample design. The relative allocation of the national sample across the states and territories has increased in Tasmania, Northern Territory and New South Wales, while the relative allocation in the remaining states and Australian Capital Territory has decreased as a result. Analysis has shown the target accuracy for employment and unemployment estimates in Western Australian and Australian Capital Territory can be attained with a smaller sample size than the 2006 sample design.

## SAMPLE SIZE

The sample design is specified in terms of selecting a proportion of dwellings within the state/territory. This is the sampling fraction. Traditionally the sampling fraction is not changed during the five-year life of the sample design, meaning that the sample size increases over time as the population size grows, resulting in a gradual increase in the number of persons enumerated during the life of each sample design. While the outcome of this is some improvement in the accuracy of the survey results, the improvement is partially offset by a deterioration in the efficiency of the sample in the period since the previous sample design. Further, as more dwellings are added to the survey over time, the operational costs of collecting the data increase. At each sample design, a new sampling fraction is determined to produce estimates at the desired level of accuracy and this usually results in a decrease in sample size. One notable change to the level of accuracy occurred from July 2008 through to November 2009, when there was a 24% reduction in the size of the LFS sample as part of a savings initiative. More detail is available on this reduction in July 2008 and reinstatement in

December 2009 in Information Paper: Labour Force Survey Sample Design, Nov 2007 (Third edition) (cat. no. 6269.0).

In the 2011 sample design, the initial sample size is expected to be about 4% smaller than the sample at the start of the 2006 design. The new sample has been designed with the aim of achieving similar levels of sampling error as the target levels established for the 2006 sample design. Generally the previous design achieved lower levels of sampling error than the sample was designed for, allowing for a reduction in the 2011 sample size to match the 2006 targets. The reduction in sample size is predicted to generally result in RSEs for employment at the same or similar level to those achieved under the previous sample design, but slightly lower than the target RSEs from the 2006 sample design. Predicted RSEs for unemployment are expected to be generally slightly higher than those achieved under the 2006 sample design (although Tasmania and Northern Territory are predicted to be slightly lower). The Impact on Standard Errors section of this information paper has further information on expected RSEs.

When the new sample is fully implemented in August 2013, the LFS is expected to comprise about 26,200 private dwellings; 400 non-private dwellings; and 150 dwellings from discrete Aboriginal and Torres Strait Islander communities. This is expected to result in about 52,200 persons responding to the survey, covering about 1 in 312 (0.32%) of the civilian population aged 15 years and over.

## SAMPLING FRACTIONS

Table 1 gives the sampling fractions for each state and territory as a result of each sample design from 1976 through to 2011.

**TABLE 1. SAMPLING FRACTIONS, By year of sample design**

	1976	1981	1986	1991	1996	2001	2006	2011
<b>New South Wales</b>	1 in 200	1 in 200	1 in 230	1 in 277	1 in 300	1 in 321	1 in 380	1 in 419
<b>Victoria</b>	1 in 200	1 in 200	1 in 230	1 in 242	1 in 257	1 in 270	1 in 336	1 in 390
<b>Queensland</b>	1 in 140	1 in 140	1 in 160	1 in 195	1 in 222	1 in 239	1 in 315	1 in 369
<b>South Australia</b>	1 in 100	1 in 100	1 in 115	1 in 139	1 in 147	1 in 149	1 in 184	1 in 209
<b>Western Australia</b>	1 in 90	1 in 100	1 in 115	1 in 146	1 in 160	1 in 165	1 in 246	1 in 295
<b>Tasmania</b>	1 in 60	1 in 60	1 in 70	1 in 75	1 in 83	1 in 90	1 in 103	1 in 99
<b>Northern Territory</b>	1 in 100	1 in 100	1 in 115	1 in 75	1 in 85	1 in 98	1 in 54	1 in 52
<b>Australian Capital Territory</b>	1 in 100	1 in 100	1 in 115	1 in 75	1 in 85	1 in 86	1 in 117	1 in 149

Sampling fractions have changed from the 2006 design due to:

- a reduction in the 2011 initial sample size to maintain the same 2006 sample design target accuracy measures; and
- population increases since the 2006 sample design.

## PHASE-IN PERIOD

To reduce the potential impact of the change in sample on labour force statistics, the new sample is being phased-in progressively.

The private dwelling sample in urban centres and non-remote areas, will be phased-in over a four month period from May 2013 to August 2013. In each of these four months one-quarter of the new sample will be introduced, This represents almost 90% of the total sample.

The rest of the sample (in the more remote, less populated areas and for non-private dwellings) will be introduced in two stages: in June 2013 for Tasmania, the Northern Territory and the Australian Capital Territory, and in July 2013 for New South Wales, Victoria, Queensland, South Australia and Western Australia.

The sample of dwellings in discrete Aboriginal and Torres Strait Islander communities will continue to be maintained from the 2006 design in the short term and new selections are planned to be implemented by the end of 2013.

This method of implementation means that most of the changes to labour force statistics due to differences between the two samples will be spread over the four months. Previous redesigns have introduced the new sample over periods of one, four or eight months. The 2006 sample was phased-in over eight months.

The increased sample rotation during the phase-in of the new sample over the four month period will have an impact on the quality of estimates. Movement standard errors will increase by approximately 10%. Due to the use of composite estimation, there will only be a marginal impact on the quality of level estimates. Gross Flows analysis will be impacted by the phase-in with between 60% and 70% of the sample available for matching between the current and previous months, instead of the usual 80%. After the phase-in to the new sample, the quality of level and movement estimates will align with those to be expected for the 2011 design. For more detail see table in the Impact on Standard Errors section.

## Previous Sample Designs



### PREVIOUS SAMPLE DESIGNS

The basic sampling methodology of the LFS has remained almost the same since the first survey was run in 1960. The main changes in sample design and estimation procedures introduced at each sample design are summarised below.

1971 sample design:

- the introduction of different sampling fractions across states and territories
- a reduction in sample size through reducing the overall sampling fraction from 1 in 100 to about 1 in 150.

1976 sample design:

- the introduction of regional stratification
- the introduction of a one-eighth rotation scheme in the non-private dwelling sample
- an increase in the Australian Capital Territory sampling fraction from 1 in 200 to 1 in 100.

1981 sample design:

- a change in estimation procedure from state/territory of enumeration to state/territory of usual residence
- transfer of caravan parks from the private dwelling sample to the non-private dwelling

sample

- reduction of sample fraction in Western Australia from 1 in 90 to 1 in 100, due to population growth.

1986 sample design:

- a reduction in the overall sampling fraction of approximately 13%, resulting in a total initial sample size about 3,000 persons (4%) less than that at the start of the 1981 redesign sample
- changes to certain regional boundaries in New South Wales, Victoria and Queensland.

1991 sample design:

- the introduction of a new allocation formula for state and territory sampling fractions, resulting in an increase in the sampling fractions for Northern Territory and Australian Capital Territory and a decrease for states
- transfer of predominantly long-stay caravan parks from the non-private dwelling sample to the private dwelling sample
- changes made to regional boundaries in Victoria and Queensland
- a reduction in the sample size of about 3,000 persons (4%), compared to the start of the 1986 sample design.

1996 sample design:

- improved design efficiency arising from the introduction of telephone interviewing (which enabled selection of a less-clustered design)
- an overall reduction in the sample size of about 1,500 persons (2%) compared with the start of the 1991 sample design.

2001 sample design:

- the introduction of a sample frame for discrete Aboriginal and Torres Strait Islander communities to aid enumeration
- a move to Australian Standard Geographical Classification (ASGC) Remoteness structure rather than population density for sample selection in less populated areas
- a change in non-private dwelling enumeration from all hotel and motel units to only those occupied by usual residents
- a small gain in sample efficiency arising from the use of improved information in the technical stages of sample design and of sample selection
- a reduction in the sample size of about 1,500 persons (3%) compared with the initial 1996 sample design.

2006 sample design:

- the inclusion of the Northern Territory and Australian Capital Territory in the allocation formula for state and territory sampling fractions, resulting in an increase in sample allocation for the Northern Territory and a decrease in sample allocation for states and the Australian Capital Territory
- better identification of expected growth areas in states and territories, resulting in an improved private dwelling sample over time
- significant changes made to regional boundaries in Queensland and minor changes to

those in New South Wales

- the introduction of composite estimation with the resulting efficiency gain leading to a reduction in the sample size of about 6,800 persons (11%) compared with the initial 2001 sample design.

Other changes outside of five-yearly sample design:

- July 2008 - as one of a range of ABS savings initiatives for 2008-09, there was a 24% reduction in the LFS sample size. The sample was subsequently restored to its previous size over a four month phase-in period between September and December 2009.

## Impact on Standard Errors



### IMPACT ON STANDARD ERRORS

#### STANDARD ERRORS

Standard errors, including those for employment and unemployment estimates, associated with the 2011 sample design are predicted to generally align with the target 2006 design standard errors. For unemployment the 2011 design (target) standard errors will generally be slightly higher than those that were actually achieved under the 2006 sample. In the case of employment estimates, the standard errors, under the 2011 design, are predicted to typically be lower than standard errors predicted at the time of the sample design of the 2006 sample. The change in standard errors will be fully evident once the transition from old to new sample is complete, i.e. from September 2013. The transition itself will have a short-term impact on the standard errors of the LFS movement estimates.

The sample is being phased-in over the four month period May 2013 to August 2013. Over the four months, the LFS sample will become progressively smaller because the 2011 sample is smaller than the current sample size used in the first half of 2013. The standard errors will progressively change from the current levels to the new levels by September 2013.

There will be an additional short-term impact on the standard errors during the phase-in of the new sample. Introducing two rotation groups from the new sample per month (compared to the usual introduction of one rotation group each month) reduces the proportion of common selections each month over the period between May and August 2013. As a result, the standard errors on month-to-month movement estimates are predicted to increase by approximately 10% during this period and will only have a marginal impact on the quality of level estimates. This is an improvement on the 22% increase in movement standard errors reported in the July 2012 Labour Force, Australia, Jul 2012 (cat. no. 6202.0) because the multipliers used in composite estimation have since been optimised during the phase-in to reduce the impact of the increase in rotation.

The standard errors are published each month for key estimates in Labour Force, Australia (cat. no. 6202.0). These published standard errors have been statistically modelled as a function of the estimate itself. The ABS makes these models available on the ABS web site <[www.abs.gov.au](http://www.abs.gov.au)> to allow the estimation of the standard error of any LFS statistic.

The updated standard errors will be incorporated from the May 2013 issue of Labour Force,

Australia (cat. no. 6202.0), which will be released on 13 June 2013. The revised models will be made available through the product Labour Force Survey Standard Errors, Data Cube (cat. no. 6298.0.55.001), which will also be released in June 2013. The Information Paper: Labour Force Survey Standard Errors, 2005 (cat. no. 6298.0), has not been updated but contains relevant information on standard errors for the LFS.

## RELATIVE STANDARD ERRORS

The table below shows the target RSEs for the 2006 sample design, the RSEs actually achieved during the 2006 sample design, and the predicted RSEs for the 2011 sample design.

The table shows that, averaged over the life of the new 2011 sample design, the predicted RSEs for employment at the national, state and territory level are expected to be generally the same or similar to those achieved under the previous sample design, but slightly lower than the target RSEs from the 2006 sample design. Predicted RSEs for unemployment at the national, state and territory level are expected to be generally slightly higher than those achieved under the 2006 sample design (although Tasmania and Northern Territory are predicted to be slightly lower).

The 2011 sample design aimed to attain RSEs comparable to the target RSEs from the 2006 design. However, analysis of recent LFS data suggests that a larger sample size is required to achieve the unemployment 2006 target RSEs compared with the sample size required to achieve the employment 2006 target RSEs. A hybrid measure of sampling error which combines the sampling error for estimating employment and unemployment was used to define a single target RSE. The sample size required to achieve this hybrid target RSE has resulted in the predicted RSEs for unemployment generally being higher than the target RSEs from the 2006 design.

**TABLE: STANDARD ERRORS TARGET AND ACHIEVED, 2006 and 2011 Sample Design**

	Employment RSE (%)			Unemployment RSE (%)		
	2006 Target	2006 Achieved	2011 Design	2006 Target	2006 Achieved	2011 Design
<b>New South Wales</b>	0.8%	0.7%	0.7%	5.0%	4.9%	5.0%
<b>Victoria</b>	0.8%	0.7%	0.7%	5.3%	5.2%	5.3%
<b>Queensland</b>	0.9%	0.8%	0.8%	5.7%	5.8%	5.9%
<b>South Australia</b>	1.1%	1.0%	1.0%	6.7%	6.9%	7.1%
<b>Western Australia</b>	1.0%	0.9%	0.9%	7.1%	7.4%	7.7%
<b>Tasmania</b>	1.5%	1.4%	1.4%	8.3%	9.2%	8.8%
<b>Northern Territory</b>	2.3%	2.4%	2.1%	12.9%	16.6%	16.2%
<b>Australian Capital Territory</b>	1.3%	1.3%	1.4%	13.9%	13.2%	13.8%
<b>Australia</b>	0.4%	0.4%	0.4%	2.6%	2.6%	2.6%

## Regional Estimates



### REGIONAL ESTIMATES

### LABOUR FORCE SURVEY STATISTICAL REGIONS

The LFS is designed primarily to produce reliable estimates at the national, then state and territory levels, but it also delivers estimates for a number of regions within states and territories.

LFS Statistical Regions were established to meet user interest in small area data from the LFS. These regions were originally established following analysis of data from Censuses of Population and Housing, extensive consultation with major users of labour force data, consideration of regional population levels required to yield reliable estimates, and the need for consistency with other statistical collections. Regional estimates are available monthly through Labour Force, Australia, Detailed - Electronic Delivery (cat. no. 6291.0.55.001). (Table 16).

## CHANGES TO LFS REGIONS

The LFS Statistical Regions used for the publication of labour force statistics are based on the Australian Standard Geographical Classification (ASGC) (cat. no. 1216.0). The ABS has recently introduced a new standard, the Australian Statistical Geography Standard (ASGS) (cat. nos. 1270.0.55.001 to 1270.0.55.006) which supersedes the ASGC. The new sample design uses the ASGS mesh blocks. From August 2013, the whole LFS sample will be selected under ASGS. The data will continue to be published on the ASGC basis until the January 2014 issue, when the estimates are rebased using the 2011 Census of Population and Housing.

Until the completion of 2011 Census rebasing in the January 2014 issue, estimates will continue to be weighted and published under the current ASGC Capital City / Balance of State geographical boundaries and Labour Force Dissemination Regions. From the January 2014 issue onwards, Labour Force estimates and the regional time series will be published under the ASGS. These estimates will be re-weighted to the new ASGS Greater Capital City Statistical Areas (GCCSA) and Rest of State/Territory boundaries as well as the Statistical Area Level 4 (SA4) Labour Market Regions.

The time series will be reweighted and, depending on the outcome of further investigations, published back to July 1991 for the National, State/Territory, and GCCSA/Rest of State/Territory geographic levels and SA4 Level estimates are likely to be revised back to 2003.

As is the current practice, future sample designs are expected to see regional boundaries updated to align with the ASGS edition current for the Census on which the design is based. For further information see Australian Statistical Geography Standard (ASGS) (cat. nos. 1270.0.55.001 to 1270.0.55.006)

## QUALITY OF ESTIMATES

As with state and national estimates, regional labour force estimates are subject to sampling error. Compared with estimates at state level, estimates for regions are based on smaller samples and are subject to higher relative standard errors. The LFS is not designed to provide accurate regional estimates. The ABS has taken steps to improve the quality of the small area estimates from the LFS and the February 2004 survey introduced regional population benchmarks for estimating and releasing regional labour force estimates. These benchmarks are classified by LFS Statistical Region of usual residence and sex. The regional labour force estimates were revised back to January 1999 to include regional benchmarks and this change made a modest improvement in the quality of regional labour force estimates without compromising the quality of the national, state and territory estimates. However care should still be taken in the interpretation of regional estimates. The standard errors for each region are available through the product Labour Force Survey Standard Errors, Data Cube



(cat. no. 6298.0.55.001). Overall, caution should be taken using regional statistics given the high degree of variability, particularly for the regions with smaller populations. Greater improvement in the quality of small area estimates from the LFS would require a substantial increase in sample size and would increase the cost of the survey and respondent load.


From the January 2014 issue, the number of labour force regional series will expand from 69 customised ASGC-based regions to the 106 standard ASGS SA4 Labour Market Regions. This finer level regional data will be subject to higher sampling error than ASGC dissemination regions due to the smaller populations in each region, but this will be offset against greater consistency and comparability between regional data across ABS products. Standard errors for each SA4 region will be available in a future edition of Labour Force Survey Standard Errors (cat. no. 6298.0.55.001) after the January 2014 issue release in February 2014.

For more information on the quality of estimates for the ASGC regions refer to the feature article Labour Force Survey Regions published in the July 2004 issue of Australian Labour Market Statistics (cat. no. 6105.0). This publication is available on the ABS web site <[www.abs.gov.au](http://www.abs.gov.au)> (Statistics).

## DATA COMPARABILITY

The changes arising from the introduction of the ASGS, together with the introduction of the new sample (the new sample selected to represent each region may have different characteristics to the old sample) is likely to cause significant disturbance to Regional statistics from the LFS for May to August 2013 as the new LFS sample is gradually implemented. As a result of the method of implementation of the new LFS sample, regions in more remote areas will be more subject to disturbances than those in less remote areas. The ABS advises using annual average estimates for regions to minimise the variation over time in the sample.

## Other Estimates



Value	Change
3,000.02	38.97
2,640.71	33.37
807.50	2.1
10,744.54	96

### OTHER ESTIMATES

#### LABOUR FORCE SURVEY

The LFS is designed primarily to provide estimates of key labour force statistics. The LFS also provides other non-key monthly estimates, as well as quarterly estimates, for example employment by industry and occupation.

#### ASSOCIATED SURVEYS

A number of surveys are conducted each year as supplements to the LFS. These annual, biennial or irregular collections provide statistics on particular aspects of the labour force and on other topics such as environmental issues, education and child care.

In addition, the Multipurpose Household Survey (MPHS) is also conducted as a supplement to the LFS. This survey provides statistics for a small number of labour, social and economic topics. The survey is conducted on a proportion of the outgoing rotation group of the LFS sample, and aggregates data collected over a 12 month financial year.

As at May 2013, the Table below provides a list of recent labour force related supplementary surveys.

	cat. no.	Frequency	Latest issue
<b>Monthly Population Supplementary Surveys</b>			
Characteristics of Recent Migrants, Australia(a)	6250.0	Irregular	November 2010
Child Employment, Australia	6211.0	Irregular	June 2006
Childhood Education and Care, Australia	4402.0	Irregular	June 2011
Education and Work, Australia	6227.0	Annual	May 2012
Employee Earnings, Benefits, and Trade Union Membership, Australia	6310.0	Annual	August 2012
Forms of Employment, Australia	6359.0	Annual	November 2012
Job Search Experience, Australia	6222.0	Annual	July 2012
Labour Force Experience, Australia	6206.0	Biennial	February 2011
Labour Mobility, Australia	6209.0	Biennial	February 2012
Locations of Work, Australia	6275.0	Irregular	November 2008
Multiple Jobholding, Australia(b)	6216.0	Irregular	August 1997
Persons Not in the Labour Force, Australia	6220.0	Annual	September 2012
Pregnancy and Employment Transitions, Australia	4913.0	Irregular	November 2011
Underemployed Workers, Australia	6265.0	Annual	September 2012
Working Time Arrangements, Australia(c)	6342.0	Irregular	November 2012
<b>Multi-Purpose Household Surveys</b>			
Barriers and Incentives to Labour Force Participation, Australia	6239.0	Biennial	2010-2011
Retirement and Retirement Intentions, Australia	6238.0	Biennial	2010-2011
Work-Related Injuries, Australia	6324.0	Irregular	2009-2010

(a) This product replaces the publication Labour Force Status and Other Characteristics of Migrants, Australia (cat. no. 6250.0).

(b) Data available on request for July 2001 or see Employment Arrangements, Retirement and Superannuation, Australia, Apr to Jul 2007 (Re-issue) (cat. no. 6361.0).

(c) In 2006 this product replaced the publication Working Arrangements, Australia (cat. no. 6342.0).

The Supplementary Surveys and the MPHS will move to the 2011 sample design at the same time as the LFS. The impact on the level RSEs in these surveys is expected to be similar to the impacts predicted for the LFS. Due to their frequency and design the sample selected in each Supplementary Survey and the MPHS does not overlap with the sample selected for the previous version of the survey. As a result the introduction of a new LFS sample design will have little impact on movements over time between estimates based on the 2006 and 2011 sample designs.

The ABS is planning a number of improvements to the content of the Labour Force Survey and labour supplementary surveys from July 2014. For more information on the Labour Household Survey Program from July 2014, see Information Paper: Outcomes of the Labour Household Surveys Content Review (cat. no. 6107.0).

## About this Release

This Information Paper is released every five years to coincide with Labour Force Survey (LFS) sample re-selection. The sample is based on information collected in the latest Census of Population and Housing.

The paper provides detailed information on the LFS sample design based on the 2011 Census of Population and Housing. It also outlines changes made for the latest sample design.

These changes include:

1. The use of a new Australian Statistical Geography Standard (ASGS) for sample selection and output.
2. The roll-out of the new sample over a four month period from May 2013 to August 2013.
3. The decoupling (separation) of the samples for the Monthly Population Survey (including the Labour Force Survey) and for Special Supplementary Surveys.

# Explanatory Notes

## Abbreviations

### ABBREVIATIONS

ABS	Australian Bureau of Statistics
ASGC	Australian Standard Geographical Classification
ASGS	Australian Statistical Geography Standard
GCCSA	Greater Capital City Statistical Areas
G-NAF	Geocoded National Address File
LFS	Labour Force Survey
MPHS	Multipurpose Household Survey
RSE	Relative Standard Error
SA4	Statistical Area Level 4

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